

SLS Newsletter

NEWS FROM THE SEATTLE LONGITUDINAL STUDY

THE PENNSYLVANIA STATE UNIVERSITY

FALL 1993

Results from the 1991-92 Study Cycle

A BRIEF HISTORY OF THE SEATTLE LONGITUDINAL STUDY

The Seattle Longitudinal Study was begun in 1956 by Dr. K. Warner Schaie in cooperation with the Group Health Cooperative of Puget Sound. The purpose of the research is to study various aspects of psychological development during the adult years. In 1956, five hundred Group Health members participated in first study. They were randomly selected from the Group Health membership and ranged in age from the early 20s to the late 60s. The study has been continued in seven-year intervals: 1963, 1970, 1977, 1984, and 1991. At each interval all persons who had previously participated in the study were asked to be studied again. In addition at each seven-year interval, a new group of persons randomly selected from the Group Health membership have been asked to participate. Approximately 5,000 adults have participated in the study. Approximately 70 persons who began the study in 1956 have now been in the study for 35 years. Current participants range in age from 22 to 92 years. In addition to the main study, in 1989-90, data was collected from many adult children as well as sisters and brothers of our main study participants in order to determine the extent of family similarity in mental abilities and some other psychological characteristics.

The Seattle Longitudinal Study is considered to be one of the most extensive psychological studies of how people develop and change throughout adulthood. Dr. Schaie and his

Instead of the formal reports that we have sent to study participants in the past we have decided to shift to a "newsletter" format that presents the study findings more succinctly and in more readable form. For those who might be interested in the technical details of these studies, further information is available in technical publications, which are cited on Page 3.

We are pleased to be able to tell you that the National Institute on Aging has approved continuation of the SLS for another cycle. In line with our usual 7-year intervals, we expect to reassess members of the family study beginning in 1996, those who participated in the training study beginning in 1997, and those in the longitudinal study in 1998.

In the mean time we hope to stay in touch via an occasional newsletter to tell you about results of our ongoing data analyses.

colleagues have written over 60 articles and chapters in scientific publications on findings from the study. Numerous newspaper and magazine articles as well as educational television programs have referred to the study. Dr. Schaie has testified before the U.S. Senate Special Committee on Aging regarding findings from the study, and study results have been used as evidence in legal proceedings on age discrimination in employment.

WHO ARE THE SLS PARTICIPANTS?

Since the study began in 1956, a grand total of 4957 adults have participated in the research! Approximately equal numbers of women (N = 2621) and men (N = 2336) have participated. In the most recent phase of the study occurring in 1990/1992, there were 1810 participants. This included 1117 adults who had been involved in the study previously and 693 new members participating for the first time.

The five oldest participants in 1990/92 were 92 years old. Let's hope that in 1998 we will have some centenarians in the study! As might be expected, the "baby boomers" are well represented in the study with approximately 600 participants. The youngest member in 1990/92 was 22 years old. Are there any "first timers" (those participating in 1956) remaining in the study? Yes! 71 "first timers" continue in the study, with equal numbers of men (N = 35) and women (N = 36).

FAMILY SIMILARITY IN MENTAL ABILITIES

In 1989 a new component of the Seattle Longitudinal Study was begun. Its primary purpose was to study the similarity in mental abilities and some other psychological characteristics among adult family members. Similarity in mental ability performance has been known to exist for parents and their young children, perhaps because they live in the same environment. If similarities persist when family members become adults and strike out on their own, then it would be more likely that family similarity in abilities might in part be inherited. This study examined whether family similarity in mental abilities is found not only at early ages but is maintained throughout adult life.

Participants in the Seattle Longitudinal Study were asked to provide names and address of their adult children and of their brothers and sisters. These family members were contacted and invited to participate in the Family Similarity Study. A total of 1176 persons who were children or sisters/brothers of SLS study participants took part in the Family Similarity Study. This included 776 adult children (465

SLS FEATURED IN PBS SERIES ON AGING

Several SLS study participants and staff members were featured in a segment of a 13-hour television program on aging - **Growing Old in a New Age**. Dr. Schaie and Dr. Willis are also featured in the series. The series was developed by the Center on Aging at the University of Hawaii with funding from the Annenberg Foundation. More than 80 elders and 60 gerontological experts are included in the series. The series explores myths and sheds light on what it really means to be an older person in today's society. The series is being shown in the Seattle area on PBS stations.

daughters and 311 sons), and 400 siblings (248 sisters and 152 brothers). These family members took the same tests that had been given to SLS study participants.

We found that there is substantial family similarity for virtually all mental abilities and measures of flexibility. Similarities in mental ability were found both for parents and their adult children, and for brothers and sisters. The proportion of ability shared between parents and adult children or between siblings was, on average, about 25%. The two exceptions to this findings were for the attitude measure of Social Responsibility and for a measure of perceptual speed; neither of these seems to display inherited characteristics. These findings are similar to previous research examining similarity in mental ability between parents and young children.

There will be a follow-up of members of the Family Similarity Study (beginning in 1996) so that we can compare how the abilities of family members *change* over time, as compared to how their parents' and/or siblings' abilities have changed.

The Seattle Longitudinal Study is supported by Research Grant R37 AG08055 from the National Institute on Aging. K. Warner Schaie, Principal Investigator; Sherry L. Willis, Co-Investigator.

COGNITIVE TRAINING IN OLD AGE

In 1984 we began to conduct cognitive training interventions with older members of the SLS. The purpose was to see whether these adults' performance on the mental abilities of Reasoning and Spatial Orientation could improve as a result of training. All participants in the training study were 65 years of age or older when first trained and had been in the SLS for at least 14 years prior to training.

In 1983/84 we examined the scores of eligible participants and classified them as having remained stable or having reliably decline across the previous 14 years on the abilities of Spatial Orientation and Reasoning. Participants then took part in five training sessions conducted in their home. Results of the 1983/84 training study indicated that two-thirds of participants benefitted significantly from training. Of those who had reliably declined, approximately 40% could be returned to the level of ability they had held 14 years previously.

In 1990/91 we conducted a second phase of the training study to answer three additional questions. First we wanted to know whether the cognitive training in 1983/84 provided benefits that lasted over extended periods of time. Training participants were reassessed in 1990/91. There was substantial maintenance of function on the trained ability, even after a seven-year interval. This effect was most pronounced for those participants who had been classified as decliners for purposes of the initial training.

Second, we wanted to know whether it was possible to use booster training to reverse further losses that occur as study participants move into advanced old age. Participants first trained in 1983/84 were given booster training in 1990/91. Significant improvement resulted from the booster training for both training conditions. The average magnitude of improvement due to booster training was somewhat smaller than the improvement from the original training; but note that all participants who received booster training were now seven years older.

Third, we wanted to know whether we could replicate our training results with a new group of elderly. In 1990/91 a new group of 180 participants received training for the first time. Training improvement was again demonstrated for this new group of trainees, thus, replicating our 1983/84 findings.

RECENT SLS PUBLICATIONS IN THE SCIENTIFIC LITERATURE

Schaie, K. W. (1993). The Seattle Longitudinal Studies of adult intellectual abilities. *Current Directions in Psychological Science*, 2, Nr. 6 (December).

Schaie, K. W., Dutta, R., & Willis, S. L. (1991). The relationship between rigidity-flexibility and cognitive abilities in adulthood. *Psychology and Aging*, 6, 371-383.

Schaie, K. W., Plomin, R., Willis, S. L., Gruber-Baldini, A., & Dutta, R. (1992). Natural cohorts: Family similarity in adult cognition. In T. Sonderegger (Eds.), *Psychology and aging: Nebraska Symposium on Motivation, 1991* (pp. 205-243). Lincoln, NE: University of Nebraska Press.

Schaie, K. W., Plomin, R., Willis, S. L., Gruber-Baldini, A. L., Dutta, R., & Bayen, U. (1993). Family similarity in adult intellectual development. In J. J. F. Schroots (Ed.), *Aging, health and competence: The next generation of longitudinal research* (pp. 183-198). Amsterdam: Elsevier.

Schaie, K. W., & Willis, S. L. (1991). Adult personality and psychomotor performance: Cross-sectional and longitudinal analyses. *Journal of Gerontology: Psychological Sciences*, 46, P275-284.

Schaie, K. W., & Willis, S. L. (1993). Age difference patterns of psychometric intelligence in adulthood: Generalizability within and across ability domains. *Psychology and Aging*, 8, 44-55.

Willis, S. L., & Schaie, K. W. (1994). Cognitive training in the normal elderly. In F. Boller (Ed.), *Cerebral plasticity and cognitive stimulation*. New York: Springer-Verlag.

HEALTH AND INTELLECTUAL FUNCTIONING

Most people would agree that there is some type of relationship between the health of an individual and his or her level of intellectual functioning. Studying the relationship between health and intelligence, however, is very complicated. It is likely that the relationship is *reciprocal*. That is, a healthy body facilitates one's mental functioning and being intellectually competent increases the likelihood of maintaining good health. In order to begin to understand the interrelationship between health and intellectual functioning, changes in individuals' health and in their mental abilities need to be studied for a number of years.

A very important feature of the Seattle study is that participants are or have been members of the Group Health Cooperative. Study members have agreed to allow the SLS access to their medical records. Medical librarians have been involved in abstracting information from SLS participants' records. Several types of information on each study member have been recorded, including the types of chronic disease, the number of physician visits, and the number of episodes or "spells of illness."

Occurrence of various diseases

Diseases vary not only in how common they are, but also in how often they co-occur with other diseases. The co-occurrence of multiple diseases in an individual is known as comorbidity.

Arthritis was the most common chronic condition among SLS participants, followed by vision problems, neoplasms, and hypertension. There are gender differences in the occurrence of various diseases. Women had higher rates of arthritis, benign cardiovascular disease, benign neoplasms (e.g., skin cancer), and osteoporosis. There was a higher frequency of chronic conditions such as atherosclerosis, cerebrovascular disease, and malignant neoplasms in men.

It should come as no surprise that the prevalence of most chronic diseases increases

with age. Among SLS members, the average age for onset of chronic diseases was between 50 and 60 years of age. Diseases such as rheumatoid arthritis, benign cardiovascular disease and nonmalignant neoplasms had a somewhat earlier age of onset, while the onset of conditions such as osteoarthritis, atherosclerosis, and malignant neoplasms occurred on average after age 60.

Older adults are more likely to experience more than one chronic disease, so comorbidity also increases with age. While adults younger than age 46 had on average only one chronic disease, middle-aged adults (46-60 years) had an average of two chronic diseases, and older adults (60-74 years) had an average of three chronic diseases. The two most frequently co-occurring chronic diseases were arthritis and benign neoplasms, present in 43% of the SLS membership. Vision problems co-occurred with arthritis in 40% of the group; and arthritis and benign cardiovascular disease co-occurred in 36% of the SLS members.

Chronic diseases and decline in mental abilities

Since long-term information on both chronic diseases and change in mental ability was available, it was possible to examine whether having a chronic condition increased either the likelihood of decline in mental ability or the magnitude of decline. Mental ability decline associated with two of the most common chronic diseases, arthritis and cardiovascular disease, have been studied.

Arthritis and ability decline

Individuals diagnosed to have arthritis were more likely to experience decline in reasoning ability performance. Individuals diagnosed with arthritis before age 60 were found to experience the greatest magnitude of decline in reasoning ability. However, most of the decline in reasoning ability did not occur until after age 74.

Cardiovascular disease and ability decline.

In studying the relationship between cardiovascular disease and ability decline, it is very important to distinguish between uncomplicated hypertension and cardiovascular disease. Uncomplicated hypertension does not

(continued on page 5)

ADULTS' PERCEPTIONS OF THEIR MENTAL ABILITY

A major aim of the Seattle Study has been the objective assessment of adults' mental abilities by means of test performance; by studying the same individuals over many years, change in mental ability performance was assessed. When participants come to take the tests, they often tell us how they think they are doing - whether they believe they are doing as well, better, or more poorly than when they took the tests seven years previously. Participants' own beliefs or perceptions of their mental ability functioning is known as subjective assessment. Studying the relationship between adults' subjective assessment and the objective assessment of mental abilities has become a topic of much interest in adult development and aging, for several reasons. It would be useful to know how accurate adults' are in their beliefs or perceptions about their mental abilities. Can adults' judge when they have improved or declined in mental ability? Are adults' subjective assessments better for some abilities (e.g., verbal ability) than for other abilities (e.g., number)? Are men or women, or younger or older adults more accurate in judging change in mental ability?

In the 1984 phase of the SLS, we began to study subjective as well as objective assessment of mental abilities. Participants were asked to rate whether they thought their current ability performance was the same, worse, or better than their performance seven years previously. Participants were asked to make these ratings after taking each of five different types of ability tests (verbal, number, reasoning, spatial orientation, and word fluency). Since objective test scores on these abilities were also available at each SLS study phase, it was possible to examine the relationship between subjective and objective assessment, and to study accuracy of subjective assessment.

Perceptions of change in mental ability.

The majority of participants thought that their mental abilities had remained *stable* over

HEALTH AND INTELLECTUAL FUNCTIONING (continued from page 4)

appear to be related to decline, but more severe forms of cardiovascular disease have been related to decline in reasoning and number ability.

Conclusions from the Study of Health and Intellectual Functioning

It appears that decline in mental ability which is associated with chronic disease is quite selective. That is, no single chronic disease was related to global decline in all of the mental abilities studied. A particular chronic disease (e.g., arthritis) was related to decline in only a few mental abilities.

Second, even when chronic disease is related to ability decline, the decline is likely to occur at later ages. That is, while an individual may be diagnosed with a chronic condition in their fifties or sixties, ability decline that can be related to the disease often does not become evident until a later age, the seventies or eighties. This, for example appears to be the case for a chronic disease such as arthritis. In addition, less severe forms of a chronic disease, such as benign hypertension, may not be related to ability decline. These findings point to the importance of early treatment for many chronic diseases.

Third, there are wide individual differences in the relationship between chronic disease and change in ability functioning. Not all individuals who suffer a particular chronic disease will experience decline in a mental ability. The effects of a disease may be offset, for example, by factors such as a higher educational level that may be related to seeking earlier and better medical treatment. The findings reported above are based on the total SLS membership and cannot be generalized to a particular individual. The findings, however, are useful in providing the "big picture" in terms of the relationship between health and intellectual ability.

the previous seven years. Verbal ability was the ability thought to have remained most stable; 70% of participants judged no change in their vocabulary test performance. In contrast, only

(continued on page 6)

ADULTS' PERCEPTIONS OF THEIR MENTAL ABILITY (continued from page 5)

half of all subjects perceived their spatial orientation ability to have remained stable. Approximately 13-20% of participants judged that their mental abilities had *improved*. Reasoning ability was perceived to have improved by 22% of the group, whereas only 13% rated themselves as having improved in spatial orientation. The largest differences among abilities occurred for judgments of decline. Only 8% of participants felt they had *declined* on Verbal ability, whereas almost 40% believed they were performing more poorly on tests of spatial orientation than they had seven years ago.

Differences in perceptions by age and gender.

Do young and older adults differ in their perceptions of change in ability? Do the perceptions of men and women differ? More *young* adults rated themselves to have improved on verbal ability and on reasoning ability, than did older adults. In contrast, more *older* adults rated themselves as having remained stable or improved on number ability, compared with younger adults.P

Interestingly, there were few differences in perceptions between men and women, when age of the adult was taken into account. The only significant gender difference in perceptions was for spatial orientation ability. The proportion of men and women who judged themselves to have improved on spatial ability did not differ, but a greater proportion of women than men rated themselves as having declined.

Accuracy in perceptions.

How accurate were participants in their perceptions of whether their mental ability performance had changed? To study this question, we categorized participants into three groups. Realists were those who were accurate in their judgments. There was agreement between their test scores and perceptions. For example, they rated themselves as having declined and their test scores actually did decline; or they perceived themselves to be stable and indeed their test scores had not changed reliably. Optimists were those who thought they were doing better

than their test scores indicated. They thought they had improved when their test scores showed no change or decline. Pessimists rated themselves more negatively than their test scores indicated. They thought they had remained stable when their test scores had improved; or they thought they had declined when there was no change in their test scores.

Approximately half of the participants were *realistic* in their judgments of change or stability in their abilities. Participants were most accurate (realistic) in estimating stability or change in Verbal ability. Approximately 30% of participants were *optimists*, judging themselves to have improved or remained stable, when test scores indicated stability or decline. The proportion of *pessimists* varied across abilities. Approximately 33% of participants were pessimists with respect to spatial ability, but only 10% were pessimists with respect to Verbal ability.

DR. SCHAIE RECEIVES MAJOR AWARD

Dr. K. Warner Schaie, Director of the Seattle Longitudinal Study, was a recipient of the 1992 Distinguished Scientific Contribution Award from the American Psychological Association. This is a highly prestigious award given to a select group of individuals who have made distinguished theoretical or empirical contributions to basic research in psychology.

The award announcement stated "as a developmental theoretician and researcher, he has made a landmark contribution to our understanding of the conditions that determine and surround the variations in the nature of aging. His powerful and long-term longitudinal research program on adult intelligence has been the seminal force behind challenges to simple models of cognitive aging, and has opened new vistas to studies of the latent potential in old age." Dr. Schaie made a presentation on findings from the Seattle Longitudinal Study at the 1993 meeting of the American Psychological Association as part of the receipt of the award.